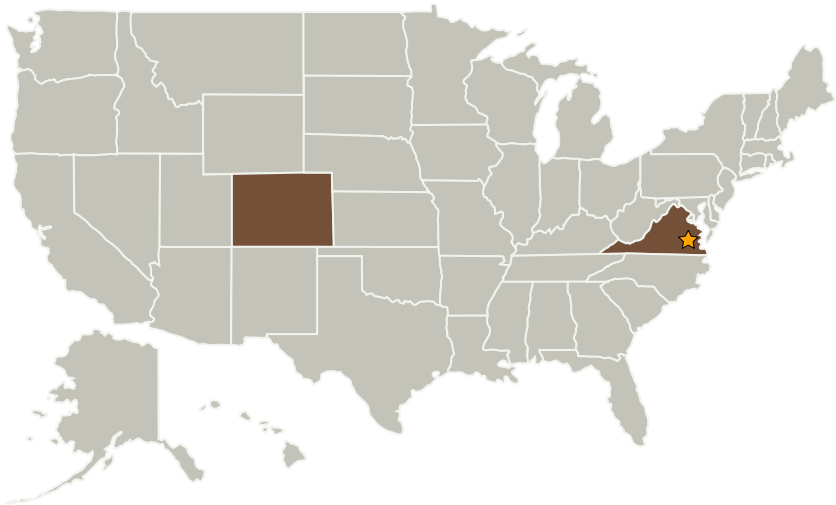
# Rugged Low Temperature Actuators for Tunable Fabry Perot Optical Filters, Phase II

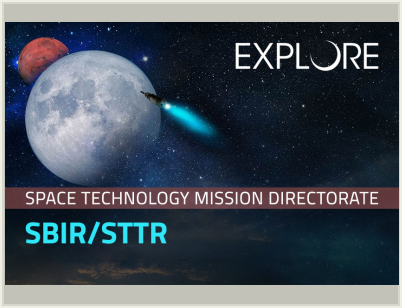
Completed Technology Project (2004 - 2006)

## Project Introduction

Why are rugged, low temperature actuator materials important? By themselves, they are useless; however, when fabricated into thin films and integrated into optical devices that require movement of optical surfaces for functionality, they extend the device operational envelope into temperature and environmental extremes not previously accessible. The actuator media also serves as a compliant adhesive that holds optical surfaces to rigid mechanical supports and allows optical devices to survive extremely low temperatures and harsh vibration environments such as vehicle launch without producing deleterious high voltage. Our actuator technology enables tunable optical devices without a media like liquid crystals in the optical path. Consequently, our optical devices will have superior optical performance limited only by the quality of the optical coatings and substrate surfaces. Several areas will be advanced by this new low-temperature actuator technology. High-resolution tunable optical filters such as Fabry-Perot optical filters are needed in direct-detection LIDAR applications to spectrally resolve the back scattered radiation broadened by temperature and Doppler-shifted by atmospheric winds. When used in imaging spectrometers, the ability to cool the narrowband optical filter and retain etalon plate motion will allow greater instrumental sensitivity to resolving trace ChemBio species. Our rugged low temperature actuator technology could enhance device operation on airborne and satellite platforms.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Langley Research Center (LaRC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Langley Research Center(LaRC) | Lead Organization | NASA Center | Hampton, Virginia |
| Perdix Inc | Supporting Organization | Industry | Boulder, Colorado |

| Primary U.S. Work Locations | |
|---|---|
| Colorado | Virginia |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems